

**MISSOURI DEPARTMENT OF NATURAL RESOURCES
AIR AND LAND PROTECTION DIVISION
ENVIRONMENTAL SERVICES PROGRAM
Standard Operating Procedures**

SOP #: MDNR-WQMS-215 EFFECTIVE DATE: November 4, 2002

SOP TITLE: Set-up and Use of the ISCO Model 1640 Liquid Level Sample Actuator

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SUMMARY OF REVISIONS: Not applicable, this is a new SOP

APPLICABILITY: The procedures established in this SOP apply to all personnel
 who wish to sample intermittent flows with an ISCO
 automatic wastewater sampler.

DISTRIBUTION: MoDNR Intranet
 ESP FSS Section Chief
 ESP SOP Coordinator
 WQMS Section Chief

RECERTIFICATION RECORD:

Date Reviewed				
Initials				

1.0 GENERAL OVERVIEW

- 1.1 The ISCO Model 1640 Liquid Level Sample Actuator is designed to be used in conjunction with an ISCO automatic wastewater sampler when sampling intermittent flows of water or wastewater. The actuator allows the programmed sampling routine of the automatic sampler to be initiated or halted depending on the water level and placement of the actuator's sensor.
- 1.2 The actuator consists of a control box assembly connected to a 22-foot coaxial cable. The coaxial cable has an attached probe covered by a plastic rain deflector. Mounting hardware is also provided for both the control box and for the actuator probe.
- 1.3 The control box assembly includes the toggle switch for selection of operating mode and the sampler connector cable for the power input and output signal.

2.0 HEALTH AND SAFETY REQUIREMENTS

- 2.1 Personnel who sample wastewater or surface water of unknown origin are encouraged to use the appropriate level of personal protective equipment (such as clean disposable gloves and rubber boots) to protect themselves from water borne illnesses when conducting field activities.
- 2.2 Personnel should participate in medical monitoring in accordance with the MDNR Division's medical monitoring policy. All field personnel who are routinely exposed to wastewater should be familiar with the hepatitis A prevention vaccine policy.

3.0 PERSONNEL QUALIFICATIONS

Field personnel shall have a working knowledge of field sample collection procedures and all applicable standard operating procedures. Staff should also be very familiar with the use and maintenance of the various ISCO wastewater samplers used by the Environmental Services Program's Water Quality Monitoring Section.

4.0 SET-UP AND OPERATION OF THE ISCO MODEL 1640 LIQUID LEVEL SAMPLE ACTUATOR

- 4.1 The set-up of the actuator involves the mounting of the control box to the sampler unit and the placement of the actuator probe above the flow stream using weather resistant hardware. The operation of the actuator depends somewhat on the model of ISCO sampler that may be utilized. The actuator will perform with all of the ISCO models the Environmental Services Program presently uses (models 1580, 1680, 2700, 2710, 2900, 2910, and 6700). However, due to the programming

capabilities of the newer ISCO models, the actuator's functions are greatly enhanced with ISCO models 2700 and higher. Although the actuator may be used in either the ISCO's flow or time mode, this Standard Operating Procedure (SOP) will deal only with the actuator's operation in the time mode (as ESP does not do flow-proportioned sampling).

NOTE: The flow mode requires a separate flow measuring device and a Y-connect cable.

- 4.1.1 To mount the control box to the sampler, remove the cover from the adhesive strip (from the back of the control box) and affix the box to the metal clip provided with the actuator assembly.
- 4.1.2 Attach the metal clip to the top of the sampler's battery or power pack and attach the connector cable to the flow meter socket of the sampler.
- 4.1.3 The probe assembly should be rigidly mounted above the flow stream using weather resistant hardware. The probe must be mounted within 22 ft. of the sampler due to the length of the coaxial cable. A probe clamp is provided with the actuator assembly which holds the cable and also permits the clamp to be attached to a round stake or rod (such as steel rebar).
- 4.1.4 The probe is mounted over the flow stream with the stainless steel pin pointing down towards the water surface. The plastic rain deflector should be positioned so that it nearly covers the probe. The inside of the deflector should be kept clean and care should be taken to ensure that the vent hole is unobstructed. The vent hole allows air to escape as the water level rises inside the deflector. The actuator will be triggered when the water level reaches the stainless steel ring located just above the probe tip.
- 4.2 The actuator has two basic modes of operation; **Latch** and **Toggle/Reset**. The mode can be selected by the use of the toggle switch located on the control box of the unit. The particular mode of operation selected depends on the nature of the flow stream to be sampled and the needs of the investigator. The **Latch** mode would be used when the investigator desires the sampling program to be activated by the actuator at the predetermined water level and the sampling program to run continually until the sampling program is completed. In this mode once the sampler is activated it will remain activated regardless of the water level. The **Toggle** mode would be used when the investigator desires samples to be taken only when the water level has reached the actuator and has remained at that level. In the **Toggle** mode the sampling program is activated when water reaches the actuator but will inactivate the sampler if the water level falls below the actuator. The model of ISCO sampler being used may also be a factor due to their various programming capabilities. For the purpose of this SOP, a description of operation

will be explained for early ISCO models (1580 and 1680) and for the later models (2700 series and higher).

4.2.1 To set the early model ISCO samplers (1580 and 1680) to the **LATCH** mode, follow the steps indicated below.

- Program the time interval selected by following the instructions in the sampler's manual or SOP MDNR-FSS-201 (Use, Cleaning, and Maintenance of ISCO Automatic Wastewater Samplers).
- Place the sampler's *PUMP* switch in the *AUTO* position.
- Momentarily set the actuator *CONTROL* switch to the *TOGGLE/RESET* position to reset the actuator.
- Set the *CONTROL* switch to the *LATCH* position.

A sampler with the actuator's control switch in the **LATCH** mode will be activated and sampling will begin as soon as the water level reaches the stainless steel ring on the probe assembly, providing the time programmed between sampling events has been exceeded. The sampler will then return to its programmed time intervals and continue until the sampler is shut off. If the programmed time between samples has not been surpassed, the sampler will refrain from taking a sample until the programmed sampling time arrives. The sampler will then take samples as programmed until the sampler is either manually shut-off (the model 1580) or all of the sample bottles are filled (the model 1680).

4.2.2 To set the early model ISCO samplers (1580 and 1680) to the **TOGGLE** mode, follow the steps indicated below.

- Program the time interval selected by following the instructions in the sampler's manual.
- Place the sampler's *PUMP* switch in the *AUTO* position.
- Set the actuator's *CONTROL* switch to the *TOGGLE/RESET* position

When the water level reaches the probe assembly the actuator in the **TOGGLE** mode will activate the sampler in the same manner as in the **LATCH** mode (see 4.2.1). However, the sampler will continue taking

samples only as long as the water level remains touching the stainless steel ring in the probe assembly.

- 4.3 The newer model ISCOs (2700s and higher) have three selectable modes to initiate the sampling program when water touches the actuator's probe assembly. The modes can be selected by placing the sampler into what is essentially a special program state. For a sampler in the standby state, pressing the *ENTER VALUE* key 5 times in succession places the sampler into the program area where the mode of actuator operation may be selected. The *MODE* and *INTERVAL BETWEEN SAMPLES* lights will be illuminated and the previously programmed actuator mode will be displayed. To change the mode of actuator operation enter the corresponding number (1, 2, or 3) on the numeric keypad. The *ENTER VALUE* and *CLEAR ENTRY* keys work as in the normal programming state. To return to the standby state press the *PROGRAM/STEP PROGRAM* key. Again, refer to the sampler's manual for particular programming instructions.

- 4.3.1 Mode 1 is used when the investigator desires to collect a sample immediately when the water level reaches the actuator's probe and then collect the remainder of the samples according to the programmed time interval between samples. The actuator should be set up for **LATCH** operation.

EXAMPLE: A sample is collected immediately when water touches the actuator's probe, and the interval to the next sample is reset to the programmed *INTERVAL BETWEEN SAMPLES*.

- 4.3.2 Mode 2 is typically used in the time mode when it is desired to delay the start of sampling until the water level reaches the probe assembly and then to synchronize the sample collection time with real clock time. The actuator should be set up for **LATCH** operation

EXAMPLE: A sample is not collected when water touches the actuator's probe and the interval to the next sample is not reset. In this mode the programmed sampling time is continually counted down even when the sampler itself is inhibited from sampling due to the actuator hook-up. This mode permits the sampling to be synchronized with real clock time.

- 4.3.3 Mode 3 is normally used when it is desired to delay the start of sampling until water reaches the probe assembly, and to use the sampler's programmed delay to initiate the first sample and the time interval between sample features. The actuator should be set up for the **TOGGLE** operation.

EXAMPLE: In mode 3 a sample is not collected when the water level reaches the actuator's probe and the interval to the next sample is not reset. The programmed sampling time does not

start counting down until the water level has reached the probe assembly. In this mode the timed delay to the first sample and the time interval between samples are both in operation.

5.0 MAINTENANCE

Maintenance of the Model 1640 Liquid Level Actuator consists of periodic inspections of all components; control box, connections, cable, rain deflector, and the stainless steel pin and ring of the probe assembly. Cracks in the cable or loosening of components should be repaired or replaced if possible. The inside of the rain deflector should be kept clean and free of debris. Special attention should be paid to the vent hole of the rain deflector to ensure it is free of obstructions. Cleaning of the cable can be accomplished by simply wiping with a damp cloth or a mild soap solution.

6.0 REFERENCES

- Instruction Manual, Model 1580 Sampler, ISCO, Inc., 1976 (revised November 1984)
- Instruction Manual, Model 1680 Sampler with L.E.D. Readout, ISCO, Inc., 1975 (revised April 27, 1979)
- Instruction Manual, Model 1640 Liquid Level Sample Actuator, ISCO, Inc., 1987 (revised August, 1993)
- Instruction Manual, Model 2710 Sampler, ISCO, Inc., 1986 (revised April 5, 1987)
- Instruction Manual, Model 2700 Sampler, ISCO, Inc., 1986 (revised January 21, 1986)
- Instruction Manual, Model 2910 Sampler, ISCO, Inc., 1991, 1992, 1993, 1994, 1995, 1996 (revised February 27, 1996)
- Instruction Manual, Model 2900 Sampler, ISCO, Inc., 1991, 1992, 1993, 1994, 1995, 1996 (revised February 27, 1996)
- Instruction Manual, 6700 Portable Samplers, ISCO, Inc., 1996, 1997 (revised 1-97)
- MDNR-FSS-201 Use, Cleaning, and Maintenance of ISCO Automatic Wastewater Samplers

ACTUATOR SET-UP AND COMPONENTS

